WHAT IS CLAIMED IS:

1. A process for olefin oligomerization in a reactor, said process comprising the steps of:

(a) providing a reaction mixture in said reactor, said reaction mixture comprising:

(i) at least one reactant comprising at least one olefin monomer and optionally at least one comonomer and optionally hydrogen and

(ii) a catalyst system suitable for the oligomerization of olefin monomers;

(b) contacting said olefin monomer and said catalyst system in a reaction zone;

(c) monitoring the process by using Raman spectrometry equipment to provide an output signal representative of one or more chemical components of the reaction; and

(d) recovering an oligomer.

2. The olefin oligomerization process of claim 1, wherein said output signal is representative of a concentration of one of said reactants or said oligomer.

3. The olefin oligomerization process of claim 1, further comprising the step of adjusting the olefin oligomerization process in response to the output signal provided by the Raman spectrometry equipment.

4. The olefin oligomerization process of claim 1, wherein the olefin oligomerization process is adjusted by adjusting the amount within said reaction mixture of at least one of said reactants, said oligomer or said catalyst system.

5. The olefin oligomerization process of claim 1, wherein said Raman spectrometry equipment is operatively connected to a Raman fiber optic probe that is in contact with said reaction mixture or said polyolefin.

6. The olefin oligomerization process of claim 5, wherein said Raman fiber optic probe is an InPhotonics probe.

7. The olefin oligomerization process of claim 5 wherein said Raman spectrometry equipment comprises low resolution Raman spectrometry equipment.

8. The olefin oligomerization process of claim 7 wherein said Raman low resolution spectrometry equipment has a resolution in the range of from about 15 wavenumbers to about 30 wavenumbers.

9. The olefin oligomerization process of claim 1, wherein said reactants comprise hydrogen.

10. The olefin oligomerization process of claim 1, wherein said process is a trimerization process.

11. The olefin oligomerization process of claim1, wherein said monomer is ethylene and said oligomer is 1-hexene.

12. The olefin oligomerization process of claim 1, wherein said process is performed in two or more reactors connected in series, wherein effluent from an upstream reactor is provided as input to a downstream reactor, wherein said monitoring step comprises determining a concentration of said monomer in said effluent by Raman spectrometry equipment, and said adjusting step comprises providing an amount of monomer or comonomer in addition to said effluent to said downstream reactor.

13. A method for monitoring and controlling an oligomerization process comprising:

(a) contacting in a reaction zone under suitable conditions a reaction mixture comprising monomer and a catalyst system;

(b) forming an oligomer;

(c) making a first measurement of a concentration of said monomer using Raman spectrometric equipment; and

(c) adjusting at least one oligomerization condition in response to first measurement.

14. The method of claim 13, wherein said first measurement is obtained before or within said reaction zone.

15. The method of claim 14, further comprising the steps of:

(c) making a second measurement of a concentration of said monomer using Raman spectrometric equipment;

(d) comparing said concentration with said second concentration; and

wherein said adjusting step at least one oligomerization condition in response to said comparing step.

16. The method of claim 15 wherein said second measurement is obtained within or after said reaction zone.

17. The method of claim 13 wherein said first measurement is obtained from said reaction zone in both gas phase and liquid phase using Raman spectrometric equipment.

18. The method of claim 15, wherein said making a first measurement comprises:

obtaining a Raman spectrum of said reaction mixture, and

determining said first measurement through the use of a calibration model.

19. The method of claim 13, further comprising, prior to step (a), the step of developing said calibration model using partial least squares analysis.

20. The method of claim 19, wherein said Raman spectrometry equipment is low resolution Raman spectrometry equipment.

21. The method of claim 20, wherein said low resolution Raman

spectrometry equipment has a resolution of about 15 wavenumbers to about 30 wavenumbers.

22. An apparatus for olefin oligomerization comprising:

oligomerization equipment comprising an oligomerization reactor for oligomerizing one or more olefins; at least one inlet to the reactor for providing one or more reactants, diluent and a catalyst system for the oligomerization; at least one outlet from the reactor for removing product from the oligomerization reactor;

at least one Raman probe located in said oligomerization equipment, said Raman probe providing an output signal;

Raman spectrometry equipment located outside said oligomerization equipment and operatively connected to said at least one Raman probe.

23. The olefin oligomerization apparatus of claim 22, further comprising a computer that receives a signal from Raman spectrometry equipment.

24. The olefin oligomerization apparatus of claim 22, wherein said computer is operatively connected to flow control equipment for adjusting a concentration of at least one of said reactants, said product or said catalyst system.

25. The olefin oligomerization apparatus of claim 22, wherein said computer is operatively connected to equipment for adjusting one or more oligomerization conditions selected from the group consisting of oligomerization temperature, oligomerization pressure, withdrawal of said reaction mixture from said reactor, and circulation rate of said reaction mixture within said reactor.

26. The olefin oligomerization apparatus of claim 22, wherein said Raman probe is a Raman fiber optic probe disposed in said outlet and operatively connected to said Raman spectrometry equipment by fiber optic cable.

27. The olefin oligomerization apparatus of claim 22, wherein said computer comprises a calibration model for converting Raman spectra to at least one concentration of one or more of said monomer and said oligomer.

28. The olefin oligomerization apparatus of claim 22, wherein said Raman probe is a Raman fiber optic probe disposed in said oligomerization reactor and operatively connected to said Raman spectrometry equipment by fiber optic cable.

29. The olefin oligomerization apparatus of claim 28, wherein said Raman probe is an InPhotonics probe.